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# Adapting the MSIS Curriculum for Healthcare

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# Adapting the MSIS Curriculum for Healthcare


## Abstract

*This paper examines the base MSIS curriculum and proposes one interpretation of that curriculum to meet the demand of the Healthcare industry. The interpretation is built around the assessment of the identification of technical skills from students in two different majors that are the fundamental target of a healthcare academic program. Through the comparisons of difference in skill sets and preferences implications for course offerings and by extension advising and student recruiting for a healthcare program are provided.*



## Keywords

MSIS curriculum, gender, IT skills


## Introduction

Imhoff et al. (2001, p179) define Health Informatics as the "development and assessment of methods and systems for the acquisition, processing and interpretation of patient data with the help of knowledge from scientific research." There is tremendous need for workers trained in health informatics. For example, the American Medical Informatics Association has created a "10 X 10 Plan" designed to produce 10,000 new professionals in this field by 2010 (AMIA, 2006). The Bureau of Labor Statistics has identified "medical records and health information technology" as the 6th largest field for projected growth, with a projected 47% increase in employment in the 10 years ending in 2012 (2004).

This demand is being driven by the adoption of technology across the whole healthcare industry. Burns et al. (2002) develop a health care value chain that runs through the gambit of healthcare industry players including but not limited to: insurers, HMOs, government, hospitals, physicians, wholesalers, drug manufacturers, device manufacturers, and individuals. A Rand Corporation study, while identifying the "relatively slow diffusion" of health information technology (HIT) and electronic medical records systems (EMR-S), isolated and examined ten major benefits that would accrue if an interoperable national system were in place, estimating an annualized net benefit of $34 billion nationally (Girosi, Meili & Scoville, 2005). It is important to note that these benefits are seen extending beyond cost savings and include improved clinical care, continuity of care and improved access, outcome transparency, and workforce improvement (Commonwealth Fund, 2006).

The need is not only within large healthcare organizations such as hospitals. Highly trained professionals are required to develop, maintain, and use the technologies throughout the healthcare value chain. These professionals will not only need to understand technology, but also key elements in healthcare, including HIPAA compliance, FDA Regulations, evidence-based practices, and the multitude of organizational issues surrounding clinical care. Thus, the case can be made for a special information systems curriculum in health informatics.

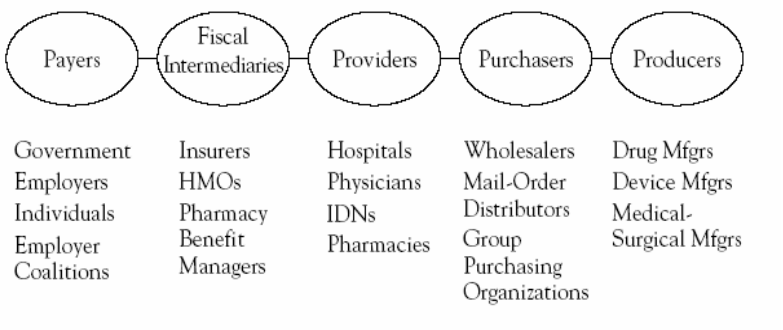


Figure 1: Burns et al (2002) Value Chain for Healthcare

This paper examines one way to tailor the base MSIS curriculum for the healthcare industry. The first step was to evaluate the base MSIS curriculum in the light of our local environment factors. One of the business areas having a high profile across the nation and also in our region is healthcare. Nationwide, this industry accounted for 1.3 Trillion dollars of GNP in 2003. Further, projections have IT providers currently spending over $40million per year in the healthcare industry (Krizner, 2006) In addition, to the shear size of the market, the US Federal Government mandates for patient information security and for interoperability between all healthcare providers are just starting to come into play. The final factor concerning healthcare is career potential; AMIA (2006) is projecting the need for more than 10,000 new jobs in the healthcare industry by 2010. All of these factors lead to scrutinizing the potential to integrate the base MSIS curriculum into healthcare.

One can see this process as the natural progression in the evolution of Information Systems. The application of information theory has evolved from traditional business transactions (Accounts Receivable) through integrated software systems for functional areas (accounting, sales tracking) into company-wide, enterprise resource planning systems (SAP, Peoplesoft), and now has the potential to move into healthcare (McNurlin & Sprague, 1998). In addition, Information Systems has made significant contributions to information science in general in the areas of relational database, project management, systems analysis and design, etc. (Benbasat & Zmud, 1998) Certainly, the methods, techniques, operational knowledge and "identity" gathered and imbedded within the field of information systems can be applied strategically and tactically to heathcare.

Just as obvious should be that the fact that the healthcare industry and business information systems field differ. The two areas appeal to people with differing interests. One area of obvious interest in course and curriculum design is gender issues (Christensen et al. 2005). Any integration of these groups must deal with these differences.

# MSIS Curriculum

## MSIS Curriculum

In MSIS 2000 curriculum, Gorgone et al. (2000) posit that the core MSIS curriculum has four components: IS prerequisites, business prerequisites, IS technology (9 units)/IS management (9 units) and track (12 units). In a 2006 follow-on MSIS curriculum proposal, they suggest alternatives to organizational behavior in the business prerequisites component: two course graduate sequence on integrated business functions and processes. In IS technology component, they suggest to add the enterprise model, emerging technology and issues. In the IS management component, they suggest to add an integrated capstone and implications for digitization. The 2006 version (Gorgone et al., 2006) calls for the emphasis on business processes, digitization, emerging technologies, and human computing interaction.

Schools of higher education are constantly pressured to update curricula to reflect industry trends and technology enhancements. Tesch et al. (2004) surveyed alumni to seek feedback on Information systems curricula. The survey was conducted in the year 2000 for alumni from the 1990s and in 2003 for graduates from 2000 to 2002. Using 1998 as an appropriate breakpoint because of the advancement of the Web and Y2K issues, alumni responses were compared across time. Their results indicate that Microsoft tools are valued by the employers, team interaction, co-op education. Peslak (2005) reviews a gap in information systems education and notes that there is a lack of education and training in business functions and processes. In addition, Peslak describes several methods (case study, business simulation, hands-on work, etc.) to incorporate business skills into a general Information and Organization course.

Using Gorgone et al.'s (2006) curriculum model as a base, we undertook the development of a MSIS curriculum to recognize the needs of the general healthcare market and our regional healthcare education needs while efficiently using our academic information systems resources.

## Majors and Skills

Many studies note the differences in student skills, knowledge, and factors that contribute to a student's selection of a major. Martz and Landof (1999) developed a survey to assess if students are being prepared with the skills and knowledge for a successful career in the real world. Both students and recruiters were assessed on 28 work related characteristics. They found that recruiters value problem-solving skills more than students and in addition there were significant differences in values between the two groups on topics such as general legal skills and analytic/conceptual skills between the recruiters and

students. Medlin et al. (2001) developed an instrument to measure a student's perception of the technical, organizational, and creative skills necessary to be successful as an IT professional in today's business environment. They assessed senior IS student views of programming, networking, database, and hardware skills, communication and leadership skills, knowledge of other technology applications, along with other managerial and employee variables. Their findings suggest that technical skills are important but are not sufficient alone for a successful information systems career. In this case, both organizational leaders as well as students recognize that in addition to knowledge of hardware and software, general communications skills, analytical skills, and managerial skills are necessary.

Fox (2001) examined high school students' perceptions and/or misconceptions of a career in IS and found that males are twice as likely as females to choose a major in IS. It seems obvious, but the time a student spends working with a PC proved positively associated with the likelihood of choosing a major in IS. Also, there is a positive correlation between courses taken at high school and the choice of IS as a major. The likelihood that a student who took programming languages will major in IS is six times higher than those students who did not take programming course. Students who enjoy math, programming, systems design, and telecommunications courses are more likely to choose IS as a major. There also exists a statistically significant relationship between perceived personal characteristics of an IS professional and the choice of major. Students who perceived IS professionals in a more positive light (i.e. to be creative, to have good interpersonal skills, to be intelligent, and to be self motivated) are more likely to select IS as a major.

Landry et al. (2004) examine ethical perceptions of Hispanic students by analyzing differences between accounting and non-accounting business majors and women and men. They find 21 significant differences between majors and 18 significant differences between genders. Weber et al. (2001) compared the ratings of information system students and industry members on the importance of several skills. Again, there were differences: interpersonal skill importance proved different between international students and industry members. They found that as students advance through their academic program, student ratings tend to become more like the industry member ratings.

Kim et al. (2002) investigated factors that were most important for students in choosing a business major, how well students understood their business major, the students' understanding of the business world, and their expectations of career success. They surveyed business students majoring in accounting, finance, marketing, management information systems/computer information systems (MIS/CIS), management, and general business. They find that students are internally motivated in their choice of a major and intend there exists differences among majors. Compared with other business majors, IS majors are driven by job prospects more than by interests in the related work. Similarly, Ridener (1999) used a pretest-posttest experimental design to compare the ecological worldviews of college students across different academic majors; they concluded there are differences between science and business majors. In this study, science majors had higher scores on the Ecological Worldview Scale, indicating a more pro-environmental attitude, than business majors.

Remarkable differences exist in the sub-disciplines of university programs in terms of expectations, course requirements, and modes of assessment. Jackson (2005) suggests the use of inter-university; cross disciplinary needs analysis to assist institutions to better deliver course objectives. In summary, prior studies support the basic contention that students within different programs will be driven and engaged by these programs on differing values and characteristics. Ultimately, to better meet the needs of the market and to educate students for that market, assessment of industry needs is necessary.

## Gender

Overall, women are under-represented in science, technology, engineering and mathematics (STEM) majors and careers in most developed countries around the world (Blickenstaff 2005). Blickenstaff recommends a fundamental reform in science education to address this problem. Currently, one can find many studies to show the differences between male and female in the computing field (Christensen et al. 2005). In general, man and women may have different attitude, behavior on technology adoption, which could be attributed to the significant difference on computer enjoyment found by Christensen et al. (2005).

Gender differences exist regardless of technology. Cleveland et al. (2003) examine the underlying determinants and the dimensionality of in-store information searches for a Christmas clothing gift, focusing specifically on the differential effect of gender on information acquisition. They conclude that females tended to acquire macro and micro information to a greater extent whereas males were more apt to seek the assistance of store sales personnel than females.

Wolin and Korgaonkar (2003) specifically investigated gender differences in consumer beliefs about Web advertising. Their results show males and females differ significantly on several dimensions with males exhibiting more positive beliefs about Web advertising and more positive attitudes toward Web advertising than females. In addition, males

are more likely than females to purchase from the Web and surf the Web for functional and entertainment reasons, whereas females are more likely to surf the Web for shopping reasons.

Dholakia and Chiang (2003) study gender-specific stereotypes with the Web shopping, which requires computer access and use. Such stereotypes may be expected because shopping is considered a "female typed" activity whereas technology is considered to be in the male domain. They find that female shopper is seen to be less technical, less spontaneous. Van Slyke et al. (2002) indicates that although men and women are equally likely to use the Internet for business and personal purposes, men are more likely than women to purchase products or services from the web.

Garbarino and Strahilevitz (2004) examine how men and women differ in both their perceptions of the risks associated with shopping online and the effect of receiving a site recommendation from a friend. Their study result suggests that when controlling for differences in Internet usage, women perceive a higher level of risk in online purchasing than do men. Furthermore, having a site recommended by a friend leads to both a greater reduction in perceived risk and a stronger increase in willingness to buy online among women than among men.

Numerous studies have explored various gender related issues. Jackson et al. (2001) report gender differences in meta characteristics such as motivational, affective and cognitive factors. In total, these research studies suggest the potential for underlying gender related issues when curriculum design is undertaken.

# Methodology

## Interview

Interviews were conducted to gather feedback about the prospect for a healthcare curriculum. In these interviews, a variety of healthcare professionals from differing industries were interviewed. Job titles included CEO, Dean, Research Director, M.D. and industry categories included Hospital, Biomedical Company, Community Health Consortium, Medical School (Table 1). One executive director of a regional medical society indicated that in his opinion, every mid-to-large physician group practice would require a health “informatician.” Every executive interviewed in our planning process across a range of organizations indicated a need for employees and a willingness to participate in the capstone course by providing residency opportunities.

| Role | Industry Category |
|---|---|
| CEO | Hospital |
| Dean & M.D. | University College |
| Executive Director | Community Health Consortium |
| Center Director | Medical School - Research |
| Senior Architect | Health Information Systems Company |
| Vice President | Medical Research Laboratory |
| CEO | Biomedical Company |
| Program Director | Graduate Program |
| Research Director | Community Health Consortium |
| CEO | Hospital |
| Associate Dean | University College |
| Teaching Faculty | Graduate School |
| Program Director | Medicine School - Graduate Program |
| Clinical Informaticist | Hospital |
| President | Community Health Consortium |
| Business Integrator | Hospital |
| Vice President – Technology | University College |
| Vice President | Community Health Consortium |
| Industry categories are representative names; any names that match exact company or organization-trademarked names are purely coincidental. | |

**Table 1 - Interviewees for Preliminary Validation**

## Surveys

The target audience for the proposed healthcare program included both nursing and business students. Based upon the literature reviewed above, we perceived students in different colleges would have different needs. The instrument was created based on interviews and discussions with executives, healthcare professionals and a literature review. Thus we believe the content validity is established. The main purpose of the survey is to assess the potential curriculum needs for our new health informatics program. A web-based survey was developed and the link to the survey was emailed to students. Surveys were sent to these two different subsets. These responses are voluntary and no bonuses or extra credits were given to students. The survey to business students was emailed to students in college of business and college of informatics and nursing informatics survey was emailed to students in the school of nursing. Altogether, we received 100 useable responses; 65 responses from business students and 35 responses from nursing students.

# Results

## Differences by Major

Table 2 shows the results of comparing the results from the two student groups. As mentioned, the sample size for the business survey is 65 and the sample size for the nursing survey is 35. The non-parametric Mann-Whitney test was used for analysis. About half of all respondents reported some knowledge about the field of health informatics; A clear mandate for the appeal of the program exists: Over 90% of the 100 respondents find the program appealing in concept; About three quarters of all respondents like the idea of a certificate program with even more showing interest in the program at the Masters level. This strong interest in the courses held up throughout the survey with the lowest level of interest only dropping to 65.63% (appealing). The Systems Analysis and Design course received the lowest interest by both groups (65.63 for Nursing students; 66.67 for Business/Informatics students). The course receiving the most interest is the Project Management course with 84.12 for Business/Informatics students and 96.97 for nursing students.

Within this mandate for the program exist some noticeable differences. For example, the nursing students value the idea of an advanced degree or certificate more than do the business students. With regard to courses, the nursing students prefer project management (InterestPM) and health informatics (InterestHealth). Nurses are less likely to have taken an IS course and they also seem to prefer night courses to daytime courses.

| | **Business Survey (%) (n=65)** | **Nursing Survey (%) (n=35)** | **Asymp. Sig (Mann-Whitney)** |
|---|---|---|---|
| **Knowledgeable** | **50.23** | **40.00** | **0.42** |
| Appealing | 90.77 | 97.15 | 0.92 |
| **LikeCertificate** | **70.77** | **88.57** | **0.17** |
| **LikeMaster** | **75.38** | **91.43** | **0.21** |
| TakenISCourse | **73.44** | **41.18** | **0.00** |
| InterestDS | 75.01 | 84.38 | 0.97 |
| InterestSAD | 66.67 | 65.63 | 0.91 |
| InterestDM | 78.13 | 87.88 | 0.86 |
| **InterestPM** | **84.12** | **96.97** | **0.39** |
| **InterestHealth** | **74.60** | **100.00** | **0.03** |
| InterestSecurity | 83.33 | 93.75 | 0.83 |
| InterestEMD | 76.19 | 96.97 | 0.33 |
| PartTime | 60.94 | 57.14 | 0.71 |
| **Nightpref** | **12.70** | **34.29** | **0.02** |

Table 2. Descriptive Statistics Percentage of students reported somewhat or definitely interested

## Gender Difference

Among all the respondents, 70% are males and 30% are females. About 96.67% of males and 91.43% of females think the new program is appealing; 70% of male and 80% of female like the idea of the certificate program; 83.33% of males and 80% of females intend to enroll in the master program. The interest in the courses held up throughout with the lowest level of interest (65.63) recorded for the Systems Analysis and Design course by both groups (63.64 for female students; 72.41 for male student). The course receiving the most interest from female students is the Project Management course (88.06%)(InterestPM) whereas the course receiving the most interest from male students is security (96.03%)(InterestSecurity).

Table 3 shows that males report higher percentage on all the items except two items: one that measures interest in getting a certificate (LikeCertificate) and interest in taking health informatics courses (InterestHealth). Males have taken more IS related courses than females. In general, males show greater interest in taking traditional IS courses: system analysis and design, decision support, project management, security and electronic medical records.

| | **Female (n=30)** | **Male (n=70)** | **Asymp. Sig (Mann-Whitney)** |
|---|---|---|---|
| Knowledgeable | 44.29 | 50.00 | 0.23 |
| Appealing | 91.43 | 96.67 | 0.75 |
| LikeCertificate | 80.00 | 70.00 | 0.88 |
| LikeMaster | 80.00 | 83.33 | 0.81 |
| **TakeIScourse** | **54.41** | **80.00** | **0.02**** |
| **InterestDS** | **74.63** | **86.21** | **0.06*** |
| **InterestSAD** | **63.64** | **72.41** | **0.18** |
| **InterestDM** | **79.41** | **86.21** | **0.02**** |
| InterestPM | **88.06** | **89.66** | 0.34 |
| **InterestHealth** | **86.57** | **75.86** | **0.06*** |
| **InterestSecurity** | **83.08** | **96.30** | **0.04**** |
| InterestEMD | 79.41 | 92.85 | 0.39 |
| NightPref | 54.41 | 60.00 | 0.43 |

Table 3. Descriptive Statistics Percentage of students reported somewhat or definitely interested

(** significant at 5%, *significant at 10%)

## Discussion

The findings are not unsuspected. There are differences between nursing students and business students in the appeal of the components of the healthcare curriculum. And not unexpectedly, there are differences found that can be attributed to gender. The importance of these findings for the development of a healthcare curriculum is the reinforcement that a health informatics program must appeal to these two subgroups. Further, given the overall ratings for the general appeal of the program, the curriculum presented seems a reasonable starting point.

## Conclusion

This paper demonstrates the customization of the base MSIS curriculum to develop a Health Informatics curriculum. The basis for the customization was driven by several key extraneous factors, local region need, resource match, and major market enablers including government mandates. From that impetus also came the realization that simply applying three or four courses as a track in a traditional MSIS program may not achieve the level of integration, and therefore success, desired.

Scanning the current health care education environment suggested that potential students attracted to a health informatics career within the Burns et al's (2002) value chain will come from at least two different subgroups; business and nursing. Data was collected that demonstrated that both subgroups carry the desire for a career in health informatics and further, showed a fundamental difference by these two subgroups in the basic appeal of courses. One area underlying this difference was gender. These findings further document those studies showing fundamental differences in appeal for information systems

between male and female students; however, it may also show that an integrative curriculum like Health Informatics that applies information systems in a way that appeals to both genders is a way to re-generate interest in MSIS programs.

Finally, this paper suggests and demonstrates that the expansion of information systems methods, techniques and concepts is the natural progression of a science based around information as a resource. It seems natural that as industries such as healthcare mature and understand the importance of information within their industry, the experience and background of information systems professionals will become integral to the progress of that industry.

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